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Challenges and opportunities in ICT educational development: A Ugandan case study

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ABSTRACT

This case study examines an organization which is partnering to provide ICT solutions for secondary schools in Uganda. Based on interviews and observation, we identify nine key transitions in this organization's development. Each transition is characterized by a challenge that was faced and a solution that was implemented or attempted. We draw broader "lessons learned" from the results to inform similar development organizations. This study intends to contribute to the dialogue concerning ICT, education, and development and aims to expose some ways to build bridges across the so-called digital divide.

Keywords: *Uganda; Computers for Africa; ICT; computer donation; educational development*

INTRODUCTION

The ubiquitous term "digital divide" is used to describe a wide range of disparate outcomes demonstrating a gap in technology resources, information, and education. Perhaps nowhere is this divide more apparent, or more discussed, than in sub-Saharan Africa (e.g., Langmia 2006). Policy makers in Africa and elsewhere have put forth technology, technical competence, and computer and information literacy as solutions for many of these problems. Indeed, ICT solutions may help to solve problems related to education such as teacher shortages, low achievement, high drop-out rates, lack of opportunity, and lack of materials (Wims & Lawler 2007). In response to these opportunities, organizations from around the world have implemented projects across the spectrum of ICT delivery. Prevalent among these are organizations which are somewhat new to international development, that are relatively small, and that do not originate in Africa.

Despite the best of intentions, many of these projects ultimately fail. There are many reasons for this: technology may not be the appropriate solution in the first place, projects may be poorly-implemented, equipment may be improperly used, there may be a lack of follow-up, stakeholders may not receive adequate training to support the program, or it may simply be difficult to create and sustain a project within a shifting social and political context. New, small, and/or foreign organizations face specific challenges in the delivery of ICT solutions for education in an international development context. The purpose of this paper is to present a case study of one such organization operating in Uganda which is succeeding in these efforts, to examine the challenges that were and are faced by that organization, and to extrapolate lessons learned for similar organizations. This study intends to contribute to the dialogue concerning ICT, education, and development and aims to expose some ways to build bridges across the so-called digital divide.

BACKGROUND AND CONTEXT

Uganda is home to about 28 million people in East Africa. The various urban areas and cities of Uganda are densely populated but Uganda is primarily an agricultural country and rich in natural resources. The seventeen year conflict in the north of Uganda has displaced between 1.3 and 2 million people. This has had devastating consequences for education, technology, and development in the northern regions, but has also taxed the entire country. For the East African region, only about .3% of the population owns a computer (Akst & Jensen 2001) and the percentage for all of sub-Saharan Africa is less than 1% (Chinn & Fairlie 2004; World telecommunication indicators database 2006).

Ugandan education takes places in a country comprised of more than 20 ethnic groups where the common language of instruction is English. Though presented with a number of technical and developmental challenges to education in addition to those mentioned above, 69.9% of Ugandans over the age of 15 are literate. President Lt. Gen. Yoweri Museveni created a system of free Universal Primary Education (UPE) for children age four and up in 1997, in response to the global call for Education for All (EFA) (Murphy 2003). This has had some success, though truly universal, quality education is a daunting and difficult task faced with specific challenges. For example, fifty percent of the population is between ages zero and fourteen and the pupil to textbook ratio is four to one.

Educational ICT in Uganda is similar in many ways to other countries in East Africa. Efforts are being made to integrate ICT into schools and curricula, but with mixed effort and success. One such effort is the New Partnership for Africa's Development (NEPAD) e-schools initiative (Evoh 2007). Bugulumbya Secondary School in Uganda was one of the first to take part in this project on the continent (APC 2005). This and similar local, national, and international initiatives show a recognition of the importance of ICT in education. However, ICT in the schools is still not the norm due to a number of logistical and developmental challenges. Even when computers are available in some schools, evaluation of the actual impact of ICT is rare, and similar to a recent study in Kenya, computers are often only used for specific courses or by specific personnel, and many teachers, students, and subject-areas still lack access to ICT (Wims & Lawler 2007).

Computers for Africa (CFA) was conceived and established by Tim and Ruth Leacock of Omaha, Nebraska in the year 2000 (http://computers4africa.org). They began with the realization that in the United States thousands of older but still serviceable computers were being warehoused and/or melted down. With the initial help of a former missionary in Uganda, they began to acquire and refurbish computers, eventually installing complete computer labs in clusters of schools around the country. They traveled to Uganda to learn more about the beneficiaries of their work. Their time in Uganda made them interested in not only delivering the much needed technology to agencies that served Ugandan youth, but also developing relationships and partnerships with the stakeholders.

The Leacocks moved to Kampala, Uganda in 2004 with one simple goal: to "share the wealth of U.S. technology with people in least developed nations" (Computers for Africa 2006). Though not specific to schools, this mission manifested itself in Ugandan secondary schools. They laid out the following mission:

- To refurbish and transport used computers to East Africa
- To provide ready-to-set-up technology centers for African non-profits
- To promote volunteer involvement in international issues
- To provide an alternative to wasteful and harmful dumping

- To build US-African relationships.

We traveled to Uganda in July, 2006 to observe and participate in CFA operations. The results presented here are the result of that trip and are intended to form a better understanding of how new development organizations can find their niche and succeed in efforts to bridge the digital divide.

METHODOLOGY

The research methodology for this study consisted solely of qualitative techniques. Since this research attempts to determine "why" technology-related projects succeed or fail, rather than simply documenting success or failure more broadly, qualitative methods and a single-project case study are the most appropriate. As qualitative researcher Robert Yin (1984) emphasizes, a case study can "explain the causal links in real-life interventions that are too complex for survey or experimental strategies" (p. 25). Within this qualitative framework, interviews were utilized to investigate the mechanisms at work. Methodology experts Rubin & Rubin (1995) claim that interviews allow one to "unravel complicated relationships" (p.51) in a way that other means do not.

Interviews were guided by questions such as:

- What institutional, societal, and personal factors affect the success of technology-related projects?
- How do these factors affect the beliefs, attitudes, and practices of various stakeholders?
- What are various stakeholders' initial perceptions and expectations of technology related projects?
- When are technology-based projects the appropriate intervention? When are they not?
- What types of planned policies and programs are most effective for promoting success before, during, and after implementation?

We used these questions via semi-structured and informal interviews with CFA personnel, with Ugandan education and/or development professionals, and with local stakeholders – i.e., computer teachers, subject-area teachers, administrators, and students. We also relied on observation by taking part in a CFA workshop with local secondary computer teachers working to form an online virtual community. This participation and observation gave us a better understanding of how the project operates and involves local stakeholders.

RESULTS

Based on interviews and observation, we identified nine key transitions in CFA's development of ICT delivery in Uganda. We present these transitions below. Each is characterized by a challenge that was faced and a solution that was implemented or attempted by CFA.

Challenge 1: long distance operations
Solution: establish a local presence and a network of local stakeholders

As described above, CFA was born in Nebraska, USA. Once a need was identified and CFA determined a way to fill this need, the organization began to send computers to Uganda. Though this was a large task for a small organization, they soon came face to face with another reality.

Namely, how could they effectively run these operations from the United States, when the need – and more importantly the ability to gauge local stakeholder desires – was in Uganda? Seeing that local participation and local ownership were crucial, CFA established local connections in the country, hired a Ugandan secondary school teacher to be Director of CFA operations in Uganda, Herbert Busiku, and the directors themselves moved to Uganda for two years.

Challenge 2: communication
Solution: streamline, direct connections, clear messages

Once established within the country, the day to day needs of running local operations became the main concern for CFA. An integral part of running any organization that deals with a diverse group of stakeholders is communication. Communication problems were exemplified by a convoluted and complex chain of phone calls, emails, and word of mouth from CFA staff to a secondary school head mistress, the result of which was more confusion than understanding. In response to this, CFA made conscious efforts to streamline communications with their stakeholders, to have direct communication and not rely on a chain of communication when possible, and to construct communication in the most understandable manner possible.

Challenge 3: cultural competence
Solution: constant awareness and diligence, proactive solutions

The previous challenge leads directly to a challenge that exists at every stage of the international development process: the challenge of cultural competence. This may take the form of language, etiquette, issues of authority or hierarchy, or an understanding of cultural subtleties such as time and relationships. Beyond these culturally constructed differences however, organizations from the global North, must also deal head on with issues of cultural bias, colonialism, imperialism, and hegemony. Though organizations may have the best of intentions, if they do not recognize and acknowledge the historical legacies of power which still have an impact, and with which they might be complicit if they aren't diligent to work against, they are likely to be missing a key cultural ingredient at this stage. CFA recognized this challenge and was alert to the potential dangers if not addressed.

Challenge 4: appropriateness for the local context
Solution: actively receive local input and respond to it

An extension of cultural understanding and the avoidance of hegemonic behavior is the need to understand the local context as it relates the project itself. In other words, how does the organizationally perceived need compare to local desires and local perceptions of need? From step one, CFA had to check their assumptions about what was needed from their viewpoint, and trust in what was needed from the perspective of teachers, students, and administrators in Uganda. These issues may be of a very practical nature. For example, CFA envisioned Linux as the operating system of choice since it was open-source and freely available. They soon had to adapt, however, when they received feedback informing them that the local context was not favorable to this, and responded by switching to a Microsoft operating system for the computer labs. (See a related discussion in Wims & Lawler 2007).

Challenge 5: defining and documenting success and failure
Solution: evaluation and assessment at every stage

The solution above is, perhaps, over-simplistic since receiving feedback is a challenge in and of itself. This desire to get stakeholder feedback is part of a larger challenge: how do we know if what we're doing is working? To answer this question, CFA first needed to be able to define what success was, and specifically what success was to their stakeholders. From that point on, they

were able to include an evaluation component at every stage of their organizational development. This includes formative evaluation as specific projects are underway and summative evaluation when project components are completed. Especially useful in this regard may be practices of participatory evaluation (e.g., Broughton & Hampshire 1997; Cracknell 2000).

Challenge 6: technical sustainability
Solution: build local skills & build a cluster/community of stakeholders

Due in large part to effective evaluation utilized by CFA, their next challenge became apparent via stakeholder feedback. Once computer labs were operational in schools, how could they be sustained? In other words, when computers had problems and needed troubleshooting and/or maintenance, how would this occur – especially in the long term, without CFA assistance? CFA responded to this challenge with a maintenance and repair workshop which supplied the local community with the skills to repair most common computer problems. In addition, from the beginning CFA conducted operations in a strategic way such that individuals could rely on a community that was organically developing out of a geographical cluster of schools, from which stakeholders could tap collective expertise to solve problems as they arose. This was extended into a virtual community in addition to a geographical one (http://www.bbukka.org) and can serve as a model for other clusters of schools and/or ICT projects in the future.

Challenge 7: organizational logistics and operations
Solution: clarify mission, respond to evaluation, consider staffing and funding

As with any organization, the day-to-day, on-the-ground operations are only a part of being successful. Although CFA had established a substantial presence in parts of Uganda, there were continual issues to deal with both in Uganda and in the United States simply due to running an international organization. As the organization came to understand that operations could be successfully expanded, personnel and funding issues arose. How many staff do we need? Can we utilize volunteers? Can we pay more local workers? How is the financial viability of the organization as a whole? Based largely on quality evaluation, CFA has responded to such issues effectively, in large part because they have a very good understanding both of their organization's mission and capacity, and the stakeholders' needs and desires. They remain small and focused, which allows them to use their resources effectively and efficiently.

Challenge 8: unintended consequences
Solution: anticipation of, vigilant monitoring for, and immediate response to them

As with any development project, and with any evaluation of such projects, unintended consequences must be considered. They should be anticipated to the extent possible, but must also be addressed as they arise. CFA quickly came to the realization that shipping computers into Ugandan schools meant that someday those Ugandan schools would have to deal with getting rid of old computers that no longer work. Typically, this meant unsafe and/or environmentally unfriendly means of disposal in a context that is not equipped to recycle used computers. CFA researched possible solutions and has worked to begin a secondary operation and/or a partnership for recycling computers from Uganda. This issue remains under study and is yet unresolved.

Challenge 9: external obstacles
Solution: research and developing expertise and/or partnerships in other development efforts

As with all development work, there are challenges that arise externally over which the organization has very little control, but which affect operations nonetheless. In Uganda, the local power situation has been crippled due to one of the major hydroelectric dams being taken offline,

and also due to crime targeting the recently privatized power company. The result for schools with CFA computers is that they very often do not have power. Six of the seven schools we visited for our observations did not have power at the time we arrived. For schools without generators, this means that the use of computers is inconsistent at the very best. For those with generators, the schools are faced with difficult decisions concerning expensive fuel versus the use of the computers. CFA has responded to this external barrier by working with local stakeholders to research various energy options. In addition to generators, CFA is actively looking into the viability of solar power solutions for the partner schools. They are examining partnerships with solar power providers and NGOs, and are becoming experts this area of development as it suits the needs of their stakeholders.

One additional item of interest can not be effectively captured in the challenge/solution format. Rather than a challenge addressed, CFA was able to recognize an opportunity for CFA volunteers and stakeholders and to capitalize on it. As an international organization that spanned borders and effectively linked communities from the U.S. and Uganda, CFA used this position to establish relations between two international communities. The most obvious manifestation of these global relationships is travel. The Director of Ugandan Operations was able to visit the organizations' operations in Nebraska as well as attending additional training in the U.S. In addition, student volunteers from Nebraska have been able to travel to Uganda to take part in operations with local stakeholders. Beyond technical assistance, therefore, CFA is helping to build positive global understanding which will benefit efforts such as theirs in the future.

IMPLICATIONS

Each of the nine transitions described above – a challenge faced and a solution implemented – may have broader implications for similar organizations in the educational ICT development field. This section attempts to draw broader "lessons learned" from the results of the interviews and observations described above.

Lesson 1: Develop a local presence, build local networks, and develop local leadership.
CFA was able to become viable and successful by basing part of their operations in Uganda, by developing relationships with local stakeholders, and by ultimately having local leaders in charge of the implementation of the projects.

Lesson 2: Communication, communication, communication.
Communication, in any organization, can make great ideas into great successes, or can turn great ideas into failures. Operating across international and cultural boundaries amplifies this. Conscious and deliberate attempts to streamline and clarify communication are key.

Lesson 3: Cultural competence is obligatory.
The very notion of "streamlining" and "clarifying" communication may be an American cultural interpretation of events. Every phase of operations, from business communications to informal meetings, is governed by the cultural context. Building competence in the local culture is likely the only way to improve this. Of course, there will be missteps and misunderstandings, which should be addressed and corrected as they arise rather than ignored.

Lesson 4: Local stakeholders, and the context they are in, are the ultimate judges of success and/or failure.
CFA experienced a context in which selected solutions (e.g., Linux operating system) were ultimately not viable, and they proactively changed their strategies. Other organizations will face similar barriers to ideas which do not match a changing local context, and must realize that

cutting short-term losses in pursuit of ultimate success and longevity of the organization may be necessary.

Lesson 5: Evaluation, evaluation, evaluation.
Even organizations which are well-intentioned and understand their stakeholders well can not be sure that projects are having the impact which they assume. This is true of any organization, but is especially true of small organizations in challenging development environments. CFA is able to respond to barriers such as those described, in large part, due to formative and summative evaluation measures at all steps of the process.

Lesson 6: Build local skills and local ownership.
For long-term sustainability, these components are vital. For CFA this means not only developing the skills of computer usage, but of troubleshooting problems, and doing so as a community cluster of concerned stakeholders. Other organizations will have different challenges, but the sustainability of efforts, with the eventual goal of limited or no organizational support, must be a component of a successful effort.

Lesson 7: Sustain the organization as well as the projects.
Although the stakeholder-driven projects are how an organization demonstrates success and are most often the place where real passion and attention are aimed, the well-being of the organization as a whole must not be neglected. Funding, staffing, and logistical needs of the organization are not sufficient for success, but are certainly necessary.

Lesson 8: Do no harm.
The development version of the Hippocratic Oath would be to remain diligent in looking for unintended consequences. Though these may be positive effects in some cases, they are often negative. In the case of CFA, one consequence is the eventual disposal of hundreds or thousands of computers in a context not equipped to handle the safety and environmental implications. They have responded with attempts to find ways to limit this impact. All projects will have unintended consequences and organizations must take precautions to minimize negative impacts.

Lesson 9: Engage other development efforts.
CFA and their stakeholders face an energy crisis in Uganda. Therefore, they have found themselves tangentially in the field of energy development, researching solar and other solutions, as well as forming partnerships in these areas. The broader lesson is that development efforts do not exist in a vacuum. Education and ICT projects are vital components of a broader holistic development agenda that must include not only power but public health, environment, infrastructure, etc. A synergistic effort among these development sectors is likely to have an amplifying effect, above and beyond the sum of the parts.

In all, the lesson's learned by Computers for Africa's operations in Uganda can serve as a model for small development organizations in any context. Beginning with little more than a recognition of the global imbalance in information technology and computer resources, an idea of how this gap might be diminished for some stakeholders in sub-Saharan Africa, and the will and the means to attempt it, Computers for Africa has succeeded in partially achieving their goals. They continue to address new challenges as they arise and this adaptability will assist them in continuing to assist local stakeholders in bridging the digital divide.

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